



March 6, 2009

Mr. Michael Berkoff
Remedial Project Manager
United States Environmental Protection Agency
Region 5 – SR-6J
77 W. Jackson Boulevard
Chicago, IL 60604-3590

EPA Region 5 Records Ctr.



365804

Subject: Responses to the U.S. EPA's and the MDEQ's Initial Verbal Comments on the Pre-Final Design Report for the 12th Street Landfill, Otsego Township, Michigan, Operable Unit No. 4 of the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site

Dear Michael:

On behalf of Weyerhaeuser Company (Weyerhaeuser), RMT, Inc. (RMT), is submitting this letter in response to the February 11, 2009, conference call during which the U.S. EPA and the MDEQ provided initial comments on the Pre-Final Design Report for the 12th Street Landfill, Otsego Township, Michigan, dated January 2009. For ease of review, each comment for which the U.S. EPA and/or the MDEQ requested additional information/clarification is listed below (*bold, italics*), followed by our response.

1. ***RMT's experience – Additional information was requested regarding RMT's experience with similar-type landfills (i.e., paper residual landfills).***

Response: Resumes highlighting applicable project experience for RMT's key personnel working on the 12th Street Landfill project are included in Attachment 1.

2. ***Landfill gas management system design and operation – Additional information was requested to clarify the logic behind the proposed landfill gas management system design and monitoring program, and how the data collected during monitoring activities will be used to evaluate the potential need for opening the gas vents (which are proposed to be closed initially), or to install an active gas management system.***

Response: The information requested is located in different sections throughout the Pre-Final Design Report; however, additional text will be added to Subsection 2.3 (Potential Future Land Use) in the Final Design Report to clarify how certain components of the landfill design, including the landfill gas management system, can be incorporated into potential future land use options. The following additional text will be added at the end of Subsection 2.3:

Certain components of the landfill design have been developed to allow for flexibility in implementing either or both of these potential future land use concepts. A summary of

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these design components and how they will fit into future land use options is provided below.

- **Grading plan and surface water management** – Subsections 6.3.1 and 6.5 describe an approximately 8-foot-wide bench that will be created about halfway up the landfill sideslope on the northern, western, eastern, and southeastern sideslopes, which could be used as a walking path as part of a potential future eco-park. This bench will also minimize soil erosion caused by surface water runoff.
- **Final landfill cover system** – Subsection 6.4 describes that the vegetation planted over the landfill, consistent with an eco-park, will consist of a mix of grasses and forbes (flowering plants) native to the area. The vegetation will also promote surface water runoff as sheet flow and, thereby, minimize erosion.
- **Gas system** – Subsection 6.6.1 and the Responses to the U.S. EPA's Comments on the Preliminary Design Report for the 12th Street Landfill (Appendix O) describe that the potential for landfill gas generation was evaluated based on site-specific information from previous site investigations, the predesign studies performed at the site, and our experience with paper residual landfills. Weyerhaeuser has concluded that methane may be generated and may accumulate under the landfill cover; however, it is unclear whether the rate of gas production within the landfill is significant enough to warrant a gas system (passive or active) to prevent off-site gas migration after the final cover is installed. Thus, the design includes specifications for the installation of the necessary piping for a passive gas system during the final cover construction activities that can be converted to an active gas extraction system, if required.

The proposed design includes the necessary piping under the landfill cover to accommodate up to 20 passive gas vents (approximately 3 vents per acre) that will be initially closed to allow monitoring of the actual methane production rate at the site. The passive gas vents can also be tied into an active gas system, as needed.

To determine if a passive or active gas system is needed, the 20 passive gas vent locations (initially closed) will be monitored in accordance with the Performance Standards Verification Plan (PSVP) (Appendix D). As indicated in the PSVP, if the gas monitoring results indicate pressure exceeding 10 inches of water column (approximately one fifth of the pressure provided by the 2.5-foot-thick final cover) at a gas vent location, then the contingency actions in the PSVP will be implemented, which include installing the passive gas vents at the closed locations or installing an active gas system, as needed.

The passive gas vent locations will be a minimum of approximately 24 feet from the mid-slope bench that may be used as a walking path as part of a potential future eco-park. Potential risks to human health and safety associated with a future eco-park on the landfill, including potential inhalation of landfill gas by

persons using the mid-slope bench, will be evaluated as part of a potential use risk assessment that would be developed and submitted to the U.S. EPA after approximately 1 year of post-construction environmental monitoring. If pressure measurements at the passive gas vent locations show that installation of the vents (or an active system) is not necessary, and the passive gas vent locations can remain closed, potential risks from inhalation hazards will be minimized.

The PSVP lists the timing for on-going monitoring of gas pressure in the system while the vents are closed to make sure unstable conditions do not evolve at the site over time.

- ***Fencing and gates*** – Subsection 6.8.2 describes that fencing and gates will be installed along 12th Street and along certain portions of the asphalt plant property and the MDNR property boundaries to deter pedestrians and vehicular traffic from entering the landfill. The fencing and gates are consistent with existing access restrictions and likely restrictions that would be needed for a potential eco-park.

Any future recreational use of the 12th Street Landfill property would be implemented only upon the U.S. EPA's approval, including appropriate modifications to the existing Deed Restrictions and possibly the Record of Decision (ROD). Within the RD/RA process, and approximately 1 year into the Operations and Maintenance (O&M) period, Weyerhaeuser may prepare a more detailed future land use concept and relevant human health and risk assessment for presentation to the U.S. EPA, the MDEQ, and potential project stakeholders, such as the MDNR, the cities of Plainwell and Otsego, and the U.S. Fish and Wildlife Service. The input of the stakeholder group would be utilized to develop a final end use plan for review and approval by the U.S. EPA.

3. ***Surface water management system design – Additional information was requested to clarify how runoff from larger storm events (i.e., a storm event greater than a 25-year, 24-hour storm event) would be handled by the surface water management system components of the design.***

Response: The surface water management system is described in detail in Subsection 6.5 of the Design Report, in Appendix G (Surface Water Management Calculations) and Appendix O (Responses to the U.S. EPA's Comments on the Preliminary Design Report for the 12th Street Landfill). Per the requirements of the ROD, the surface water management features for the 12th Street Landfill were designed in accordance with Part 115 – Solid Waste Management Rules, which includes the stipulation that the design be for the peak discharge from a 25-year, 24-hour storm event. The actual capacity of the designed system would handle larger storms as well (see below). The surface water management features were also designed such that they could be incorporated into potential future land use options, including an eco-park. Subsections 6.3.1 and 6.5 of the Design Report describe an approximately 8-foot-wide bench that will be created about halfway up the landfill sideslope on the northern, western, eastern, and southeastern sideslopes, which could be used as a walking path as part of a potential future eco-park.

This bench will also minimize soil erosion caused by downslope overland flow by capturing surface water runoff from approximately the upper 50 percent of landfill surface area.

Detail 2 on Plan Sheet 5 showing the mid-slope bench and the associated piping to handle surface water runoff has been modified such that the piping located within the mid-slope bench will be easier to construct and the pipes will be able to handle higher peak flows than the previous design. More specifically, Detail 2 will show one 10- or 12-inch-diameter high-density polyethylene (HDPE) pipe (versus two smaller pipes in the previous design) sloped at 2 percent (minimum) attached to a 10- or 12-inch-diameter HDPE downslope flume.

Table 1 below summarizes the peak flows the piping in the modified mid-slope bench design will see during a 25-year and 100-year, 24-hour storm event and the pipes' allowable capacity. As the table shows, although designed for a 25-year, 24-hour storm event, the pipes can pass the peak flows generated by a 100-year storm event. Calculations also show that the select aggregate fill surrounding the piping should allow surface water runoff from a 100-year storm event to infiltrate into the perforated pipes. In the event that surface water runoff flows over the outer edge of the mid-slope bench, the downslope flow will be over an erosion control blanket. In the event localized erosion occurs, the Operations and Maintenance (O&M Plan) indicates repairs will be made, as necessary, to the final cover.

To maintain the slopes of the surface water piping located within the mid-slope bench, additional language will be added to the O&M Plan in the Final Design Report that specifically states that the mid-slope bench will be inspected quarterly and that if the bench (and pipes) settle differentially in excess of 0.5%, the slope of the bench (and piping) will be reset as soon as practicable, weather and site conditions permitting. It should be noted that the majority of the settlement at the landfill is expected within the first 2 years after final cover placement.

Table 1

PIPE LOCATION AND DESCRIPTION	PEAK FLOW FROM 25-YR, 24-HR STORM EVENT (cfs)	PEAK FLOW FROM 100-YR, 24-HR STORM EVENT (cfs)	ALLOWABLE PIPE CAPACITY (cfs)
<i>Piping Associated With Western Downslope Flume</i>			
10-inch-diameter western mid-slope bench pipe sloped at 2.0%	3.2	4.0	4.0
10-inch-diameter northwestern mid-slope bench pipe sloped at 2.0%	2.0	2.6	4.0
10-inch-diameter western downslope flume sloped at 25.0%	5.2	6.6	14.2

Table 1

PIPE LOCATION AND DESCRIPTION	PEAK FLOW FROM 25-YR, 24-HR STORM EVENT (cfs)	PEAK FLOW FROM 100-YR, 24-HR STORM EVENT (cfs)	ALLOWABLE PIPE CAPACITY (cfs)
<i>Piping Associated With Eastern Downslope Flume</i>			
12-inch-diameter southeastern mid-slope bench pipe sloped at 2.0%	4.5	5.7	6.6
10-inch-diameter northeastern mid-slope bench pipe sloped at 2.0%	2.1	2.7	4.0
12-inch-diameter eastern downslope flume sloped at 14.8%	6.5	8.3	17.8

Table 2 below summarizes the freeboard and peak velocities in the diversion berms and ditches during a 25-year, 24-hour storm event. Table 2 also shows the allowable velocity of the berms and ditches based on the lining material (i.e., grass-lined or gravel-lined). In the event that surface water runoff overtops the berms and/or ditches, localized erosion may occur and repairs will be made, as necessary to the final cover.

Table 2

PERIMETER DITCH/DIVERSION BERM DESCRIPTION	FREEBOARD FROM 25-YR, 24-HR STORM EVENT (ft)	PEAK VELOCITY FROM 25-YR, 24-HR STORM EVENT (fps)	ALLOWABLE VELOCITY (fps)
<i>Ditches Associated with Western Drainage Areas</i>			
Western diversion berm along 12 th Street (Grass-lined)	1.4	0.6	4.0
Southwestern ditch (Grass-lined)	0.7	2.0	4.0
Western road/perimeter ditch (Gravel-lined)	0.4	1.8	3.0
<i>Ditches Associated with Eastern Drainage Areas</i>			
Eastern diversion berm along 12 th Street (Grass-lined)	1.5	0.4	4.0

Table 2

PERIMETER DITCH/DIVERSION BERM DESCRIPTION	FREEBOARD FROM 25-YR, 24-HR STORM EVENT (ft)	PEAK VELOCITY FROM 25-YR, 24-HR STORM EVENT (fps)	ALLOWABLE VELOCITY (fps)
Southeastern ditch (Grass-lined)	0.7	1.1	4.0
Eastern road/perimeter ditch (Gravel-lined)	0.4	1.2	3.0

4. *Operations and Maintenance Plan – A sample inspection form was requested to be added to the O&M Plan.*

Response: A sample inspection form will be added to the Operation and Maintenance Plan (O&M Plan) in the Final Design Report.

5. *Management of water pumped from excavations – Additional information was requested to describe a specific on-site water treatment system, such that a Substantial Requirements Document (SRD) for discharging water on-site can be obtained prior to the initiation of the remedial action construction activities.*

Response: Additional text (shown in redline/strikeout below) will be added to the last paragraph on page 35 of the Pre-Final Design Report to describe a plan for managing large volumes of groundwater that may enter into the excavation during the Remedial Action construction activities and need to be removed, treated, and discharged on-site. This plan describes the components of an on-site water treatment system similar to what was approved by the U.S. EPA during the Emergency Response Actions performed in the Kalamazoo River adjacent to the 12th Street Landfill in 2007.

Text from page 35 of the Pre-Final Design Report:

“During the predesign studies field investigation in June 2008, groundwater was encountered at a minimum of 3 feet bgs in this area. At this point in the design, whether groundwater will enter into the excavation and need to be removed from the excavation is unknown. Prior to the start of construction, the contractor performing the Remedial Action construction activities will be responsible for identifying and providing the names of a licensed transporter and disposal facility for off-site disposal in the event that water is encountered during excavation activities, and off-site disposal is needed. As applicable, the contractor will also be required to provide the sampling procedures that support acceptance at the disposal facility. All transportation and disposal contractors will be required to meet applicable provisions of federal, state, and local regulations and codes. Once an acceptable transporter and disposal site are

provided to Weyerhaeuser and within a minimum of 2 weeks prior to implementation, the proposed transporter, disposal facility, and associated sampling requirements will be provided to the U.S. EPA.

If on-site discharge of groundwater is appropriate, the contractor performing the Remedial Action construction activities will pump the water from the excavation into an on-site mobile treatment system prior to discharging on-site. The on-site mobile treatment system will consist of a storage tank(s), bag filters, and granular activated carbon filters. The effluent water will be sampled at a frequency consistent with an approved Substantive Requirement Document. If on-site discharge of groundwater is appropriate, If the contractor wishes to use other means or methods than those described above to discharge groundwater on-site, prior to the start of construction, the contractor performing the Remedial Action construction activities will be responsible for identifying and providing to Weyerhaeuser for approval, details regarding the conveyance systems to facilitate on-site discharge of groundwater. These systems will meet the requirements of federal, state, and local requirements, including development of a Substantive Requirement Document, if needed. Once these proposed management methods are reviewed and determined to be acceptable to Weyerhaeuser, and within a minimum of 2 weeks prior to implementation of the work activities, the proposed details regarding any on-site discharge of groundwater will be provided to the U.S. EPA."

6. *Vertical aquifer sampling, groundwater well design, development, and monitoring – Modifications to the vertical aquifer sampling frequency and parameters; the groundwater well design, development methodology, and level monitoring frequency were requested.*

Response: Per the e-mail sent to John Bradley (MDEQ), dated February 12, 2009, and agreed to by the MDEQ, the following changes will be included in the Final Design Report:

- Vertical aquifer sampling will be performed at 5-foot intervals from the water table to a depth of 40 feet below the water table unless a plume is identified.
- Each sample collected during vertical aquifer sampling will be analyzed for turbidity, along with other field parameters (i.e., pH, oxidation reduction potential [ORP], dissolved oxygen, specific conductance, and temperature), in accordance with SOP-F11 in the Field Sampling Plan (Appendix N of the Design Report) and included in the PSVP (Appendix D of the Design Report).
- PCBs will be analyzed in seven downgradient boring locations (MW-102 through MW-108) at the water table; 5 feet, 10 feet, and 20 feet below the water table; and at significant changes in the formation and/or significant changes in field parameters, particularly turbidity.

The following changes will also be included in the Final Design Report:

- Groundwater monitoring wells will be developed by the drilling equipment by both surging and purging with a surge block and submersible pump.

- Seven-foot well screens will be used if the results of the vertical aquifer sampling indicate that a water table well should be used to monitor landfill impacts.
- At the conclusion of a groundwater monitoring event, water levels will be measured again in the monitoring wells and the river gauge to verify that flow is still toward the river.

7. ***Construction Quality Assurance Project Plan – A professional engineer was requested to be on-site during critical portions of the remedial action construction.***

Response: Additional text will be added to Subsection 2.1 (CQA Officer) of the Construction Quality Assurance Project Plan (CQA Project Plan) in the Final Design Report, to clarify when the CQA officer, or another professional engineer registered in the State of Michigan, will be on-site during the remedial action construction.

Text from Subsection 2.1 of the CQA Project Plan.

“The CQA Officer will supervise and be responsible for all observation, testing, and related construction documentation as described in this CQA Plan. The CQA Officer will be responsible for preparing the documentation to certify substantial compliance with appropriate sections of Part 115 of Act 451 of the Michigan Department of Environmental Quality Waste and Hazardous Materials Division. The CQA Officer will be a Professional Engineer registered in the State of Michigan.

The CQA Officer may delegate daily observation and documentation, testing, and sampling duties to a qualified technician or engineer with experience in the assigned aspect of construction who will serve as the Resident Project Representative (RPR). Although these duties may be delegated, the CQA Officer will retain the responsibility for these activities. The CQA Officer, or another engineer registered in the State of Michigan, will be on-site, at a minimum, during initial paper residual excavation and relocation activities, initial landfill sideslope grading activities, and initial geomembrane placement activities.”

Additional text will also be added to Subsection 3.1 (Preconstruction Meetings) in the CQA Project Plan in the Final Design Report stating that the U.S. EPA will attend the preconstruction meeting and that an additional purpose of the meeting is “to discuss the process for obtaining U.S. EPA approval of field modifications.” Additionally, text will be added to Subsections 2.2 and 4.4 of the CQA Project Plan in the Final Design Report stating that the U.S. EPA will be consulted regarding field findings that may require changes to the Plans, Specifications, and/or the CQA Project Plan.

Sincerely,

RMT, Inc.



Michael J. Amstadt, P.E.
Senior Project Manager

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Attachments: Attachment 1 – Resumes for RMT's Key Personnel Working on the 12th Street
Landfill Project

cc: Jim Saric, Sam Chummar, Matt Mankowski – U.S. EPA
Jeff Keiser – CH2M Hill
Paul Bucholtz – MDEQ
Marvin Lewallen – Weyerhaeuser Company (E-mail only)
Richard Gay – Weyerhaeuser Company
Martin Lebo – Weyerhaeuser Company
Joe Jackowski – Weyerhaeuser Company (E-mail only)
Kathy Drahos – Weyerhaeuser Company
Mark Schneider – Perkins Coie, LLP (E-mail only)
Michael Erickson – Arcadis (E-mail only)
Kathy Huibregtse – RMT, Inc. (E-mail only)

Attachment 1

Resumes for RMT's Key Personnel Working on the 12th Street Landfill Project



Michael J. Amstadt, P.E.

Senior Project Engineer/Senior Project Manager

Experience

Mike has more than 18 years of permit, design, and construction experience with environmental and solid waste management and remediation projects. His experience includes developing and integrating the design, construction, and operation of solid waste and remedial action projects into a comprehensive solution. Mike's responsibilities include project management and coordination; quality assurance oversight; and the preparation of permit applications, subcontracts, specifications, construction plans, documentation reports, and proposals.

Key Projects

Pulp and Paper Landfill Experience

Remedial Design. 12th Street Landfill (Plainwell, Michigan). Senior Project Engineer and Project Manager.

Managed and coordinated the preparation of the remedial design of a 6-acre industrial landfill. Coordinated pre-design investigations and the evaluation of work previously performed.

Areas of Expertise

- Permit applications
- Construction management
- Construction plans
- Landfill gas issues
- Specifications
- Operation and maintenance of landfill systems

Construction Management. Inland Paperboard and Packaging, Inc. (New Johnsonville, Tennessee). Construction Manager.

Managed the construction of a clay liner for Phase 7A of a 2.5-acre industrial landfill. The work included testing soil, documenting thickness, acquiring equipment and materials, and preparing the construction documentation report.

Industrial Landfill Closure and Documentation. Inland Paperboard and Packaging, Inc. (New Johnsonville, Tennessee). Quality Control and Senior Project Engineer.

Provided quality control and engineering support for the construction of a geosynthetic clay liner final cover for Phase 7A of a 2.5-acre industrial landfill. The work included ensuring that the construction was performed in accordance with this industrial landfill's permit and preparing the construction documentation report.



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Industrial Landfill Liner Construction and Documentation. Inland Paperboard and Packaging, Inc. (New Johnsonville, Tennessee). Quality Control and Senior Project Engineer.

Provided quality control and engineering support for the construction of a clay liner for Phases 7B and 7C of a 3-acre industrial landfill. The work included ensuring that the construction was performed in accordance with the landfill's permit, and preparing the construction documentation report.

Retaining Wall Construction. Champion International Corporation (Sheldon, Texas). Resident Project Representative.

Observed and documented the construction of a retaining wall to stabilize the riverbank that provides containment for a paper mill sludge landfill. The retaining wall consisted of riprap placed on a woven geotextile, sheetpiles and H-piles, and interlocking concrete erosion control matting. Construction required testing soil and surveying.

Industrial Landfill Geosynthetic Liner Construction. Champion International Corporation (Quinnesec, Michigan). Resident Project Representative and Technical Coordinator.

Observed and documented the construction of a double geomembrane liner over a 12-acre cell at a paper mill waste management facility. Constructed perimeter berms; excavated to base grades; and installed geosynthetic components, including two layers of 60-mil HDPE geomembrane, a geosynthetic clay liner, geocomposite, geonet, and geotextile. Additional responsibilities included coordinating with other RMT field staff to assist in the collection of information; the preparation for, and the attendance at, weekly progress meetings; survey documentation; leachate system startup; and the preparation of the construction documentation report for submittal to the Michigan regulatory agency.

Paper Mill Sludge Impoundment Closure Construction. Niagara of Wisconsin Paper Corporation (Quinnesec, Michigan). Resident Project Representative and Technical Coordinator.

Observed and documented the construction of a final cover system over three paper sludge impoundments (17 acres). The work included preparing the subgrade, installing pore water/gas collection piping, constructing a lift station, installing a 40-mil PVC geomembrane liner and geotextile, and placing protective soil and topsoil. Additional responsibilities included coordinating with other RMT field staff to assist in collecting information; preparing for, and attending, weekly progress meetings; documenting survey results; and



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preparing the construction documentation report for submittal to the Michigan regulatory agency.

Plan of Operation. Appleton Papers (Appleton, Wisconsin). Project Engineer.

Assisted in preparing the plan of operation for a 15-acre industrial landfill. The work included preparing a report and design calculations.

10-Year Permit-To-Install Renewal. Champion International Corporation (Hamilton, Ohio). Senior Project Engineer.

Coordinated the preparation of a 10-Year Permit-To-Install renewal application.

Paper Mill Impoundment Construction Permit Application. Niagara of Wisconsin Paper Corporation (Niagara, Wisconsin). Project Engineer.

Prepared a construction permit that consisted of the design of two 60-mil geomembrane layers that sandwiched a geocomposite leak detection system. This liner was overlain by a leachate collection system connected to a leachate transfer system. The final cover system design consisted of a composite cover.

Permit Application for a Solid Waste Disposal Facility. Weyerhaeuser Company (Valliant, Oklahoma). Project Engineer.

Prepared a permit application for an industrial landfill. The work included the design of final grades, a storm water management system, and a leachate transfer system.

Quality Assurance Documentation. Inland Paperboard and Packaging, Inc. (New Johnsonville, Tennessee). Project Engineer.

Performed construction quality assurance for the installation of a 2-foot-thick clay cover and a vegetative layer over two industrial landfills (Phase 3A and 3B). Work included testing soil and documenting thickness, as well as preparing the construction documentation report for the two cells, which together covered 2.5 acres.

Plan/Specification Preparation. Inland Paperboard and Packaging, Inc. (New Johnsonville, Tennessee). Technical Coordinator and Senior Project Engineer.

Coordinated the preparation of plans and specifications for the final covers for Phases 7A and 7B and the liner for Phases 7B through 7E of a industrial landfill.



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Other Landfill Experience

Interim Response Workplan, State Disposal Landfill (Plainfield Township, Michigan). Senior Project Engineer.

Prepared an Interim Response Workplan for the installation of an upgraded final cover at a 32-acre municipal landfill. Work included the design of an upgraded final cover, a leachate extraction system, and a gas monitoring system.

Interim Response Workplan, Hartley and Hartley Landfill (Kawkawlin Township, Michigan). Project Manager.

Prepared an Interim Response Workplan for the installation of an upgraded final cover at a 32-acre municipal Landfill. Work included the design of an upgraded final cover and a leachate extraction system.

Remedial Design Implementation. Butterworth Landfill Superfund Site (Grand Rapids, Michigan). Senior Project Engineer.

Coordinated the implementation of the remedial design for a 160-acre closure at a municipal landfill. Work included negotiating changes to the design as needed and coordinating field activities, including gas and groundwater monitoring events.

Remedial Action Plan. Brookfield Sanitary Landfill (Brookfield, Wisconsin). Project Manager.

Managed and coordinated the preparation of a Remedial Action Plan for a 24-acre municipal landfill. Work included preparing and implementing a Remedial Action Workplan, evaluating the findings of the groundwater and gas investigation, negotiating with the regulatory agency, and preparing a Remedial Action Plan.

Remedial Design and Construction Management. Red Penn Landfill Superfund Site (Pewee Valley, Kentucky). Project Manager.

Managed and coordinated the preparation of the remedial design, plans and specifications, and the construction activities for the closure of a 48-acre municipal landfill. Performed the predesign investigation and the implementation of the design. Negotiated the final cover design with the Kentucky Division of Waste Management and the USEPA.



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Operations, Maintenance, and Monitoring (OM&M). Red Penn Landfill Superfund Site (Pewee Valley, Kentucky). Project Manager.

Presently managing and coordinating the OM&M activities for a 28-acre closed municipal waste landfill. Work includes performing groundwater and surface water monitoring, conducting site inspections, making repairs, and reporting.

Operations, Maintenance, and Monitoring. Brookfield Sanitary Landfill (Brookfield, Wisconsin). Project Manager.

Presently managing and coordinating the OM&M activities for a 24-acre closed municipal waste landfill. Work includes maintaining the active gas collection system, performing gas monitoring, conducting site inspections, making repairs, and reporting.

Operations, Maintenance, and Monitoring. Muskego Sanitary Landfill Superfund Site (Muskego, Wisconsin). Project Manager.

Presently managing and coordinating the OM&M activities for a 56-acre closed municipal waste landfill. Work includes maintaining the active gas collection system, performing gas and groundwater monitoring, conducting site inspections, making repairs, and reporting.

Operations, Maintenance, and Monitoring. HOD Landfill Superfund Site (Antioch, Illinois). Project Manager.

Presently managing and coordinating the OM&M activities for a 51-acre closed municipal waste landfill. Work includes maintaining the active gas system; performing gas, groundwater, and surface water monitoring; conducting site inspections; making repairs; and reporting. Other tasks include providing engineering support for the on-site gas-to-energy system and the implementation of the final end use, which consists of athletic fields for the local high school.

Operations, Maintenance, and Monitoring. Stone Ridge RDF (Muskego, Wisconsin). Project Manager.

Presently managing and coordinating the OM&M activities for a 24-acre closed municipal waste landfill. Work includes maintaining the active gas system, performing gas monitoring, conducting site inspections, making repairs, and reporting. Other tasks include evaluating the leachate collection system, recommending modifications to reduce the leachate head, and modifying the groundwater sampling plan.



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Operations, Maintenance, and Monitoring. Folkertsma Landfill Superfund Site (Walker, Michigan). Project Manager.

Managed and coordinated the OM&M activities for a closed landfill. Work included performing groundwater and gas monitoring, conducting site inspections, making repairs, and reporting.

Operations, Maintenance, and Monitoring. Municipal Landfill (Battle Creek, Michigan). Project Manager.

Managed and coordinated OM&M activities for an 80-acre closed municipal waste landfill. Work included maintaining the active gas extractions system, performing groundwater and gas monitoring, conducting site inspections, making repairs, and reporting.

Operations, Maintenance, and Monitoring. White Lake Landfill (Whitehall, Michigan). Project Manager.

Managed and coordinated OM&M activities for an 80-acre closed municipal waste landfill. Work included maintaining the active gas extractions system, performing groundwater and gas monitoring, conducting site inspections, making repairs, and reporting.

Operation and Maintenance. Parrott Road Landfill (New Haven, Indiana). Project Manager.

Managed and coordinated the O&M activities for a closed landfill. Work included conducting site inspections, making repairs, and reporting.

Compliance Audit. Confidential Client. Senior Project Engineer.

Performed a compliance audit for a closed landfill, specifically concerning landfill gas. Work included conducting a site visit; reviewing existing gas monitoring data, and related correspondence and design details; and comparing this information to local, state, and federal regulations.

Landfill Closure Design. City of Murfreesboro Municipal Landfill (Murfreesboro, Tennessee). Technical Coordinator and Senior Project Engineer.

Coordinated and provided technical assistance with preliminary field investigations and the design of the landfill cover and gas extraction system. Also coordinated the preparation of a project manual and plan set for the closure design.



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Industrial Disposal Facility Operation and Inspections. Wabash Alloys Disposal Facility (Wabash Alloys, Indiana). Senior Project Engineer.

Conducted landfill and storm water inspections, and provided recommendations regarding the operations of this industrial disposal facility to ensure compliance with the permit.

Industrial Landfill Operational Assistance. GMPT, Defiance (Defiance, Ohio). Technical Coordinator, Quality Control, and Senior Project Engineer.

Presently providing technical coordination and quality control for permit issues and construction projects at this industrial landfill. This work includes preparing project manuals, cost estimates, and documentation reports; and serving in the role of office contact during construction activities. Additional work includes preparing annual operation plans and evaluating the results of monthly waste testing.

Industrial Landfill Permit-to-Install Alteration. GMPT, Defiance (Defiance, Ohio). Technical Coordinator and Senior Project Engineer.

Updated the facility's Permit-to-Install to incorporate changes in site operations and to reduce operational costs.

Industrial Landfill Cover Construction and Documentation. Case-New Holland, Inc. (Belleville, Pennsylvania). Quality Control and Senior Project Engineer.

Provided quality control and engineering support for the construction of an asphalt that parking lot and clay cover over this industrial landfill. Work included ensuring that the construction was performed in accordance with the closure plan and preparing the construction documentation report.

Industrial Landfill Cover Design, Construction, and Documentation. American Standard (Louisville, Kentucky). Senior Project Engineer.

Designed an asphalt parking lot over this industrial landfill. Ensured that the construction was in accordance with the design, and prepared a documentation report. The work included performing surface water calculations and grading the site to allow for the installation of an asphalt cover.

Landfill Closure Construction and Documentation. 4 R Landfill (Beaver Dam, Wisconsin). Technical Coordinator and Project Engineer.

Coordinated construction quality assurance activities for the construction of the final cover over Phases 1 and 2 of this municipal landfill. Also coordinated and prepared the documentation report. The design of this cover system consisted of a PVC liner, 2 feet of general fill, 6 inches of topsoil, and a passive gas system



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that was overlain by 2 feet of compacted clay. Final cover construction also included the installation of erosion control measures, passive gas probes, and a leachate head well.

Landfill Liner Construction and Documentation Report. Green County Landfill, Phase IV (Brodhead, Wisconsin). Project Engineer.

Coordinated construction quality assurance for the installation of a geomembrane and leachate collection and transfer system at a 2.5-acre municipal landfill. Also performed a technical review of the documentation report.

Construction of Final Cover System. Municipal Landfill Superfund Site (Algoma, Wisconsin). Resident Project Representative.

Observed and documented the construction of the final cover of three individual municipal landfills that covered approximately 17 acres. The design for this cover system consisted of a passive gas system overlain by 2 feet of compacted clay, 2 feet of general fill, and 6 inches of topsoil. The closure of the site included modifying final grades to accommodate changes in the limits of waste discovered during construction, performing air monitoring, soil, sampling and testing, surveying, and monitoring gas probes.

Quality Assurance Documentation. Emerald Park Incorporated (Muskego, Wisconsin). Representative Project Engineer.

Performed construction quality assurance for the installation of a 60-mil HDPE geomembrane liner for Phase 1 and Phase 2 (24 acres).

Construction of Final Cover System. White New Idea Landfill Superfund Site (Charles City, Iowa). Resident Project Representative and Health and Safety Representative.

Observed and documented the construction of the final cover of a 14-acre industrial landfill. The design for this cover system consisted of 2 feet of compacted clay and 6 inches of topsoil. The closure of this site included testing soil, surveying, handling over 30 drums discovered during the waste regrading process, and deploying a woven geotextile to traverse unstable subgrade conditions discovered during the waste regrading process.

Feasibility Report. Superior Services, Inc., Superior Emerald Park Landfill (Muskego, Wisconsin). Senior Project Engineer.

Assisted in preparing the feasibility report for a 50-acre vertical and horizontal expansion of a municipal solid waste landfill. Prepared design calculations and a needs analysis.



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Plan of Operations. Superior Services, Inc., Superior Emerald Park Landfill (Muskego, Wisconsin). Senior Project Engineer.

Assisted in preparing the plan of operation for a 50-acre vertical and horizontal expansion of a municipal solid waste landfill. Conducted surface water and landfill gas calculations.

Feasibility Report. Waupaca Foundry (Waupaca, Wisconsin). Senior Project Engineer.

Assisted in preparing the feasibility report for an expansion of an industrial solid waste landfill. Prepared a needs analysis and design calculations.

Feasibility Report. Land Reclamation Company (Racine, Wisconsin). Project Engineer.

Assisted in preparing the feasibility report for a 65-acre vertical and horizontal expansion of a municipal landfill. The work included designing a composite liner and cover system, and a leachate and surface water management system.

Plan of Operation. Land Reclamation Company (Racine, Wisconsin). Project Engineer.

Assisted in preparing the plan of operation for a 65-acre vertical and horizontal expansion of a municipal landfill. Prepared a report and design calculations.

Feasibility Report. Future Parkland Development, Inc. (Muskego, Wisconsin). Technical Coordinator and Project Engineer.

Coordinated and assisted in preparing the feasibility report for a vertical and horizontal expansion of an industrial landfill. The feasibility report consisted of a wetland determination, and the design of a clay liner, a leachate collection system, and a final cover.

Significant Modification. BFI, Quad Cities Landfill (Milan, Illinois). Project Engineer.

Assisted in preparing the design report for an application for significant modification for Phases 3 and 4 of an existing permit for a 41-acre municipal landfill. The significant modifications included modifications to the design and the original permit for compliance with Subtitle D.

Developmental Permit. BFI, Orchard Hills Landfill (Davis Junction, Illinois). Project Engineer.

Prepared a developmental permit for a 175-acre municipal landfill.



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Landfill Design. City of Madison, Mineral Point Landfill (Madison, Wisconsin). Project Engineer.

Redesigned the active gas system—including the blower, header pipes, and well spacing—to provide additional interior and perimeter gas control. Prepared the specifications for the active gas system and the new composite cover. This work was completed under a consent judgment from the Wisconsin Department of Natural Resources.

Leachate Removal System and Cover Design. Arkona Road Landfill (Ypsilanti, Michigan). Project Engineer.

Assisted in developing a leachate extraction system and composite cover for a 30-acre landfill on the Michigan Superfund list.

Landfill Design. Sauk County Landfill (Reedsburg, Wisconsin). Project Engineer.

Prepared construction plans and specifications for a 7-acre area (Phase 1) of this municipal waste landfill. The project consisted of designing a geomembrane composite cover and an active gas extraction system, evaluating the existing leachate collection system, and recommending modifications to that system. This work was performed in compliance with Subtitle D.

Landfill Design and Construction Quality Assurance. Municipal Landfill (Battle Creek, Michigan). Project Engineer.

Evaluated the existing perimeter gas system at this 80-acre municipal waste landfill, and made modifications to the system to monitor the presence of off-site gas migration. Coordinated and provided technical assistance for preliminary field investigations and for the design of a final cover and active gas collection system. Acted as the office contact during the abandonment, reconditioning, and installation of perimeter gas monitoring probes and during the installation of an enhanced soil cover and active gas extraction system. The work was done under Michigan Act 307.

Remedial Design and Remedial Action Plan. Municipal Landfill (Battle Creek, Michigan). Technical Coordinator and Project Engineer.

Assisted in preparing a remedial design and remedial action plan for an 80-acre municipal waste landfill. Designed an enhanced soil cover and a gas extraction system, and developed an O&M manual.



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Project Manual for Existing CKD Placement Area Sideslope Closure. Lafarge Corporation (Alpena, Michigan). Project Engineer.

Prepared construction plans and specifications for an industrial landfill. The project included the design of a cement kiln dust-impermeable layer with a drainage and vegetative layer.

Gas Probe Installation. City of Burlington Municipal Landfill (Burlington, Wisconsin). Resident Project Representative.

Observed and documented the installation of gas monitoring probes, and performed gas monitoring to determine if off-site migration was occurring.

Remedial Investigations and Feasibility Studies. Oak Ridge Reservation (Oak Ridge, Tennessee). Project Engineer.

Participated in the development of remedial investigations and feasibility studies for the client's Y-12 Plant on the Oak Ridge Reservation, which was covered under the auspices of the Environmental Restoration Program.

Education and Training

B.S., Civil and Environmental Engineering, University of Wisconsin - Madison,
1990

American Red Cross; Standard First Aid and Adult CPR

OSHA 40-hour Hazardous Waste Site Worker Training with Annual 8-Hour
Refresher Courses

Registrations and Certifications

Registered Professional Engineer—Indiana, Illinois, Iowa, Kentucky, Michigan,
Missouri, Ohio, Oklahoma, Pennsylvania, Tennessee, and Wisconsin

National Council of Examiners for Engineering and Surveying

Certification, Nuclear Soil Testing Equipment Usage, Troxler Electronics
Laboratories, Research Triangle Park, North Carolina

Affiliations

North American Geosynthetics Society



R. Kent Nilsson, P.E.

Senior Project Engineer

Experience

Kent has 25 years of experience in geotechnical/environmental engineering. He has worked on various geotechnical engineering projects involving a wide variety of soil and foundation conditions including weak waste material, collapsible alluvium, expansive clays, liquefaction-susceptible soils, and deep fill embankments. Since 1990, a major focus of his work has been with pulp and paper residuals, including primary and secondary wastewater treatment sludges, boiler and fly ash, and line mud. In particular, Kent has gained recognized expertise in the constructive use of these waste materials, landfill design and closure, waste lagoon vertical expansions, alternative cover materials, and innovative construction on extremely soft waste materials. Other environmental projects include water treatment systems, bridges, retaining structures, industrial facilities, petroleum and water storage reservoirs, water distribution systems, and distressed slopes and structures.

Key Projects

Pulp and Paper Waste

Weyerhaeuser Company (Plymouth, North Carolina). Project Manager.

Managed the permitting and design of a new 100-acre paper mill landfill. Negotiations with the State permitting agency allowed the use of all synthetic materials in the liner that will result in cost savings of several million dollars over the life of the landfill.

International Paper (Courtland, Alabama). Project Engineer.

Designed a closure of an existing solid waste landfill using a 3-foot-thick sludge cap. The landfill was also regraded and retrofitted with drainage improvements to increase stability and lower leachate lead within the waste.

International Paper (Courtland, Alabama). Senior Geotechnical Engineer.

Conducted a geotechnical evaluation of unstable conditions in an 80-acre landfill so that a vertical expansion could be designed and constructed. Provided senior review of geotechnical engineering and permitting of a new solid waste disposal facility on an undeveloped 300-acre tract.

Areas of Expertise

- Landfill design, permitting, and construction
- Registered professional engineer
- Seismic design experience
- Innovative design involving pulp and paper landfills and impoundments



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Smurfit Stone Corporation (Brewton, Alabama). Project Manager/ Senior Engineer.

Permitted and designed the vertical expansion of an existing 65-acre paper mill landfill. Negotiations with state agencies were successful in allowing for permit modification to allow a long-term phased closure over 20 years. Geotechnical analysis found that paper mill sludge layer underlying the landfill provided an effective barrier to infiltration.

International Paper (Vicksburg, Mississippi). Senior Geotechnical Engineer.

Provided geotechnical engineering for a new solid waste reuse/recovery/ disposal facility to be constructed within the footprint of an existing landfill. Waste in the existing landfill was to be staged to allow the construction of a new composite liner in a saturated zone of clay material.

International Paper (Mansfield, Louisiana). Senior Project Geotechnical Engineer.

Conducted geotechnical engineering studies for the site, permitting and design of a new 100-acre landfill. Landfill was the first to be permitted under Louisiana's new industrial solid waste regulations.

Kimberly-Clark (Alabama). Civil Engineer.

Designed pilot sludge capping study of a 10-acre area of an existing pulp and paper sludge lagoon. The program will evaluate the use of dewatered sludge as a low permeability cap material as an alternative to a conventional clay cap.

Mead Corporation (Mobile, Alabama). Senior Project Engineer.

Provided geotechnical engineering design for the retrofitting of an existing landfill with a composite liner. Due to the steepness of the existing perimeter berms, the landfill liner design incorporated geogrid veneer reinforcement. The liner consisted of a geosynthetic clay liners (GCL) and FML.

Boise Cascade (Jackson, Alabama). Senior Project Engineer.

Engineer of record for a paper mill waste landfill that was redesigned to maximize the available airspace within the landfill footprint. The landfill was also retrofitted with drainage structures that significantly improved operations and placement of soft wastes.

Packaging Corporation of America (Counce, Tennessee). Senior Engineer.

Designed the vertical expansion of a 40-acre sludge impoundment that required additional capacity for holding dredged solids. Ash was diverted from disposal in the on-site landfill for use as a construction material. A large



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aggregate drainage structure provided dewatering to work toward ultimate closure. Use of the ash berms on the sludge surface constructed using geogrid reinforcement saved the mill \$1 million in capital costs and \$1.2 million in annual operating costs.

International Paper (Riegelwood, North Carolina). Senior Project Geotechnical Engineer.

Designed the vertical expansion of an existing lime mud pond. The design and construction consisted of earthen berms founded entirely in the soft saturated materials in the impoundment's interior. The berms were reinforced with structural geogrid and constructed in stages. Settlement instrumentation and post construction monitoring controlled the staging schedule.

Other Landfill and Industrial Waste

GSX (Pinewood, South Carolina). Civil Engineer.

Performed the forensic investigation of a tear in the geosynthetic liner of a Subtitle C landfill. Technical study also evaluated the overall design and operations. Testimony regarding the findings was given at legislative subcommittee hearings.

E.I. duPont de Nemours and Company (New Johnsonville, Tennessee). Senior Geotechnical Engineer.

Designed and permitted a 32-acre landfill for storage of a nonhazardous, inert iron carbonate co-product. Total capacity was estimated to be approximately 2.2 million cubic yards. Provided geotechnical engineering expertise in designing a landfill that was to retain a process waste slurry. Stability considerations required the design of interior drainage layers near the impoundment berms. Assisted in modifying operational procedures to account for the physical characteristics of the waste.

Chambers-USA Waste (Banks County, Georgia). Construction Quality Assurance (CQA) Officer.

Provided CQA oversight for the construction of a geogrid-reinforced retaining wall for an existing municipal solid waste landfill. The wall provided additional capacity for the landfill and allowed for vertical expansion.

Mueller Foundry (Albertville, Alabama). Senior Geotechnical Engineer.

Evaluated the gross stability of the landfill vertical expansion based on slope geometry, foundation characteristics, and waste properties. The vertical expansion provided an additional 24 years of disposal capacity.



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Engelhard Corporation (Attapulgus, Georgia). Senior Geotechnical Engineer.

Investigated the failure of a containment berm for an industrial process waste landfill. Designed the repair of the slope and a vertical expansion for the landfill.

Chemetals, Inc. (New Johnsonville, Tennessee). Senior Engineer.

Oversaw the design and construction of the vertical expansion of a "process muds" basin. The new basin was lined with a clay layer and synthetic liner. Because the basin was constructed on top of solids with low shear strength, the foundation was reinforced with a crushed stone layer sandwiched between structural geogrid reinforcement.

Western Carolina Regional Sewer Authority (South Carolina). Civil Engineer.

Developed a cost-effective approach to the closure of a municipal wastewater sludge basin using value engineering methods. The design ultimately accepted by South Carolina Department of Health and Environmental Control (SC DHEC) included a geogrid enforced cover in limited areas to control odor, and hydroseeding for a vegetative closure of the remainder.

Education and Training

M.E.M., Civil Engineering, Brigham Young University, Provo, Utah, 1984

B.S., Civil Engineering, Brigham Young University, Provo, Utah, 1983

40-Hour OSHA Health and Safety Training, 8-Hour Refresher Training

Waste Geotechnics; Applying the Earth Sciences to Solve Waste Disposal Problems

Designing with Geosynthetics

Sanitary Landfill Leachate and Gas Management

Slope Stability and Landslides

Behavior of Deep Foundations

Seismic Liquefaction, Soil Improvement and Geotechnical Instrumentation

Ground Modification

Expansive and Collapsible Soils

Groundwater Drainage and Low Cost Slope Stabilization Methods

Excavation Safety



R. Kent Nilsson, P.E.

Registrations and Certifications

Registered Professional Engineer - South Carolina (E3137), Georgia (#19481), North Carolina (#17543), California (#C40997), Alabama (#20390), Virginia (#402026477), Arkansas (#9136), Mississippi (#13673)

Language Skills

Reads, writes, and speaks French

Publications and Presentations

Nilsson, R. Kent, P. Dohney, L. Growney, A. Zhao. 2002. Closure of a Wastewater Treatment Impoundment Using Ash and Multilayered Geogrid. Published in TAPPI Proceedings of the 2002 Environmental Conference.

Nilsson, R. Kent, C. Bryant, J. Kloeker, J. Hege, M. Meech. 2001. *Solids Management for an Integrated Kraft Mill*. Published in TAPPI Proceedings of the 2001 Environmental Conference.

Nilsson, R. Kent, S. McGee, M. Taylor. 1997. *Closure of a 22-Acre Industrial Landfill Using Paper Industry Sludge*. Published in NCASI Technical Bulletin, Special Report No. 97-12, Solid Waste Management and Groundwater Quality.

Nilsson, R. Kent, B. Swint, G. Matlock, M. Taylor. 1996. *Retrofit of an Unlined Landfill with a Composite Liner-Design and Construction Experience*. Published in TAPPI Proceedings of the 1996 Environmental Conference.

Nilsson, R. Kent, R. Holland, R. Chewning, J. Saiia. 1995. *Use of Ash as a Construction Material in the Vertical Expansion of an Existing Sludge Pond*. Published in TAPPI Proceedings of the 1995 Environmental Conference.

Nilsson, R. Kent, J. Majtenyi, D. Lutrick, M. Taylor. 1995. In-situ Closure of a Paper Mill Fibrous Sludge Basin. Published in TAPPI Proceedings of the 1995 Environmental Conference.

Nilsson, R. Kent. 1995. Ash as Construction Material. Published in NCASI Technical Bulletin, Special Report No. 95-05. Solid Waste Minimization Practices in the Forest Products Industry.

Nilsson, R. Kent, S. McGee, M. Taylor, R. Wilkey. 1994. Construction on Unstable Paper Mill Waste Using Structural Geogrids, Published in TAPPI Proceedings of the 1994 Environmental Conference.



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Nilsson, R. Kent, J. McGraner, W. A. Soders. 1993. Vertical expansion of an existing lime mud storage pond. Published in TAPPI Proceedings of the 1993 Environmental Conference.

Nilsson, R. Kent, V.C. Jones, H. Ruppert. 1993. Vegetative closure of a pulp and paper sludge landfill. Published in TAPPI Proceedings of the 1993 Environmental Conference.

Nilsson, R. Kent. 1992. An integrated approach to the closure of pulp and paper landfills and lagoons. Published in Proceedings of the 47th Annual Purdue University Industrial Waste Conference.

Nilsson, R. Kent. 1992. Vertical expansion of a nonhazardous solid waste disposal facility, Champion International Corporation, Courtland Mill, Alabama. Published in TAPPI Proceedings of the 1992 Environmental Conference.



John M. Rice, P.E., P.H.

Hydrologist

Experience

John has over 23 years of experience in the environment field. He provides technical expertise in data management and interpretation of surface water and groundwater hydrology, aquifer testing and analysis, groundwater flow and contaminant transport modeling, surface water modeling, remedial investigations, feasibility studies, and remedial design. He has designed active groundwater and soil remediation systems that include groundwater pump and treat, soil vapor extraction (SVE), air sparging, dual-phase extraction, and biodegradation stimulation. John was recently awarded a patent for an innovative approach to facilitate the *in situ* degradation of chlorinated organic compounds.

John has directed and prepared remedial investigations, surface water and sediment investigations, groundwater assessments, and monitoring plan developments for sites located throughout the Midwest. These efforts have included compiling and interpreting hydrologic data, preparing groundwater flow and solute transport models, designing groundwater containment systems, and developing groundwater monitoring networks and sampling programs. He has also been active in the design and permitting of groundwater monitoring networks for both municipal and industrial landfills in Michigan, Wisconsin, and Illinois.

Areas of Expertise

- Surface water and groundwater hydrology
- Innovative groundwater and soil remediation system design
- Groundwater flow and solute transport models
- Sediment transport and remediation
- Hydrologic aspects of landfill permitting and design

John is a professional engineer, licensed in the states of Michigan, Wisconsin, Iowa, Kansas, and Maine. He is also a professional hydrologist licensed in the state of Wisconsin and active in the advancement of the profession through the presentations and publication of professional articles. John has previously worked in the states of Florida and Michigan.

Key Projects

Landfill Groundwater Interceptor Trench and Treatment System Design. Envirofil Landfill (McDonough County, Illinois). Lead Hydrogeologist.

Performed hydrogeologic assessment and engineering design in support of the construction of a groundwater interceptor trench and treatment system. The system was notable in that it used the available potentiometric head in the aquifer and the existing topography to collect and treat groundwater impacted by VOCs without the use of devices. Once collected, the groundwater cascades, via gravity, down a "stairway" structure to induce the aeration that eventually results in the elimination of VOC concentrations, and helps to precipitate



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dissolved iron and manganese from the water. Once at the bottom of the "stairway," the water flows into two biofilter basins. The first relies on natural biodegradation and precipitation to reduce VOCs and metals; and the second, planted with cattails that absorb the remaining metals and metabolize the remaining VOCs, serves as a polishing basin. The treated water discharges to a nearby creek. This project was recognized in 2000 by the Wisconsin Association of Consulting Engineers' Achievement Award.

Engineered Treatment Wetland Design. Onyx, Valley View Landfill (Macon County, Illinois). Lead Engineer/Hydrologist.

Performed hydrologic assessment and engineering design in support of the construction of an engineered wetland for the treatment of impacted groundwater. The wetland is designed to remove VOCs, iron, manganese, and ammonia from the influent. The design utilizes a three stage treatment train consisting of an aeration basin, a surface flow wetland, and a subsurface flow wetland. The wetlands were planted with a variety of native wetland species selected for their ability to affect treatment and for their hardiness and aesthetic beauty.

Landfill Groundwater Investigation/Assessment. Alliant Energy (various fly Ash Landfills in Iowa and Wisconsin). Lead Hydrogeologist.

Currently serving as the lead hydrogeologist for ongoing investigation and assessment of potential impacts from various fly ash landfills located in Wisconsin and Iowa. These projects involve designing and implementing groundwater investigation followed by interpreting the data.

Landfill Significant Modification. Sexton/McLean County Landfill (Bloomington, Illinois); BFI/Quad Cities Landfill (Moline, Illinois); Envotech Litchfield County Landfill (Litchfield County, Illinois). Lead Hydrogeologist.

Directed and prepared the hydrogeologic investigation, the groundwater assessment, and the groundwater monitoring sections of an application for landfill significant modification. This effort involved compiling and interpreting hydrogeologic data, preparing a solute transport model, conceptually designing a groundwater containment system, and developing a groundwater monitoring network and sampling program.

Groundwater Investigation/Disposal Area Closure. Lafarge Corporation (Alpena, Michigan). Lead Hydrogeologist.

Currently serving as the lead hydrogeologist for an ongoing investigation of potential impacts from a limestone quarry in northern Michigan. The project involves designing and implementing an investigation of groundwater, surface water, and sediment. A groundwater flow model was developed to assess the



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potential impact of the quarry and cement kiln dust disposal on the limestone aquifer. The results of the investigation and model will be used to evaluate the impact of the current operation on the local environment and the proposed closure options.

Groundwater Investigation/Permit Application. Medusa Cement Company (Charlevoix, Michigan). Lead Hydrologist.

Currently serving as the lead hydrologist for an ongoing investigation of potential impacts from a limestone quarry in northern Michigan. This modeling effort was performed to estimate the mass flux of constituents that would be transported from existing cement kiln dust disposal areas to the quarry sump. The model was used to evaluate different mitigation measures, including modifications in the future development of the quarry.

Removal Action and Engineering Evaluation/Cost Analysis. Marina Cliffs/Northwestern Barrel NPL Site (South Milwaukee, Wisconsin). Project Hydrologist/Task Leader.

Developed a workplan for the non-time-critical investigation of a former barrel reconditioning facility. The investigation is being conducted under the USEPA Superfund Accelerated Cleanup Model (SACM). The workplan called for sampling a variety of potentially affected media, conducting a geophysical survey, and preparing a risk evaluation.

Soil and Groundwater Investigation/Remedial System Design (Michigan and Wisconsin). Senior Hydrologist/Engineer.

Directed and performed various phases of soil and groundwater investigations related to releases of petroleum compounds from underground storage tanks (USTs). Designed, tested, and provided oversight for the operation of groundwater and vapor extraction systems for the removal and treatment of petroleum compounds. Clients included the following:

- Amoco (Grand Rapids, Michigan)
- Amoco (Hastings, Michigan)
- Mobil (East Lansing, Michigan)
- Phillip's 66 (Green Bay, Wisconsin)
- Quality Dairy (Lansing, Michigan)
- U.S. Oil Bulk Storage (Madison, Milwaukee, and Menasha, Wisconsin)



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Groundwater Investigation and Remedial Action Analysis. City of Sun Prairie Municipal Building (Sun Prairie, Wisconsin). Project Hydrologist/Team Leader.

Developed and implemented a phased investigation of soil and groundwater to efficiently determine the nature and extent of PCE concentrations. Working closely with the WDNR, successfully negotiated an approach of innovative source-area remediation through enhanced biodegradation in combination with natural attenuation of the downgradient dissolved-phase plume. The innovative reductive dechlorination process used in this project was awarded a U.S. patent in December 1999, and received the Wisconsin Association of Consulting Engineers' 2000 Grand Award and the 2000 American Consulting Engineers Council's Honor Award.

Groundwater Investigation. Badger Meter, Inc (Milwaukee, Wisconsin). Project Manager.

Developed and implemented a groundwater investigation to support a pilot test for the remediation of chlorinated solvents in a fractured bedrock aquifer. Led a focused project team through the successful implementation of the pilot test and full-scale implementation. Simulated the decay of trichlorethene into its breakdown products cis-1,2-dichloroethene and vinyl chloride and subsequent transport in the bedrock aquifer.

Site Closure and Redevelopment at Active Manufacturing Site. Berlin Redevelopment (Berlin, Wisconsin). Project Lead.

Developed and implemented a groundwater and soil remediation plan for chlorinated solvents that consisted of a focused soil excavation followed by the injection of potassium permanganate into the groundwater. The plan was developed to cost-effectively bring the site to closure while minimizing the client's environmental liability. Innovative contracting was used on the project to transfer environmental risk and the responsibility of performance to RMT. The site received closure from the WDNR ahead of schedule under the VPLE program, and subsequently returned to the city's tax roles.

Groundwater and Soil Remediation Plan. Medley Farms NPL Site (Gaffney, South Carolina). Project Lead.

Developed and implemented a groundwater and soil remediation plan for chlorinated solvents that consists of focused soil excavation followed by the injection of potassium permanganate into the groundwater. This plan was developed to cost-effectively bring the site to closure while minimizing the clients environmental liability. Innovative contracting was used on the project to transfer environmental risk and the responsibility of performance to RMT.



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Groundwater Investigation/Remediation. City of La Crosse Water Utility (La Crosse, Wisconsin). Lead Hydrologist.

Directed an investigation, remedial action plan, design, and implementation under the Wisconsin hazardous waste regulations (NR 600) with the cooperation of the Wisconsin Department of Natural Resources (WDNR). Rapid site characterization was used to define the downgradient location and width of the VOC plume, and a simple groundwater flow model was used to evaluate plume containment alternatives. RMT designed and installed a groundwater containment and passive treatment system that allowed one of the water supply wells to return to full service within 1 ½ years. After 3 years of operation, the aquifer was restored sufficiently to allow the system to be turned off and the second municipal well to be returned to service.

Contaminant Transport Model Review. Crandon Mine (Crandon, Wisconsin). Senior Modeler.

Provided assistance in the Wisconsin DNR's review of a groundwater flow and contaminant transport model that is being used to assess the potential future impacts of a proposed copper mine in northern Wisconsin. The modeling study used MT3D for the evaluation. A variety of parameters were varied in the model evaluation to assess the model's sensitivity and the effect of proposed hydraulic controls.

PCBs in Sediment. Manufacturing Site (Wisconsin). Senior Hydrologist.

Provided hydrologic interpretation and surface water modeling expertise related to sediment transport, sediment remediation, and historical discharges. Developed a simple model to assess the deposition of wastewater solids in the river. Assisting in developing allocation scenarios for the PRP group based on these data. Activities include presenting information to the client, reviewing and interpreting historical process and technical documents, and performing statistical analysis of data.

Remedial Investigation/Feasibility Study for Dioxins in Sediment. Confidential Client (CERCLIS Site). Remedial Investigation Task Leader.

Coordinated sampling, data management, and data interpretation for a Superfund remedial investigation (RI), which is focused on the characterization and remediation of contaminated sediment. The project included the evaluation of groundwater, surface water, and soil and sediment migration pathways for a variety of constituents, including dioxins/furans and mercury. Directly involved in the specification and installation of a cost-saving remote surface water sampling network, and in the design and implementation of



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capping and dredging pilot studies, including an innovative application of enhanced natural recovery.

Dam Removal Sediment Remediation. Alliant Energy (Baraboo, Wisconsin). Lead Hydrologist/Hydrogeology Quality Assurance.

Coordinated data management and data interpretation for a former manufactured gas plant (MGP). This project involved the evaluation of soil and groundwater impacts caused by coal tar, as well as coal tar migration into the sediment of the Baraboo River. A multi-faceted remedial approach was implemented that involved soil-vapor extraction, groundwater extraction, and dredging of the impacted sediment. After implementation of the remedies, the site was closed under risk-based guidance. The project received an ACEC state engineering excellence award.

Remedial Investigation/Feasibility Study. Alliant Energy (Fond du Lac, Wisconsin). Lead Hydrologist/Hydrogeology Quality Assurance.

Assisted in the design of a groundwater and soil remedy at a former MGP site. Analyzed site data and developed a groundwater flow model, which lead to the elimination of a proposed impermeable cap and limited groundwater/DNAPL containment system.

Remedial Investigation/Feasibility Study. Alliant Energy (Janesville, Wisconsin). Lead Hydrologist/Hydrogeology Quality Assurance.

Coordinated data management and data interpretation for a former manufactured gas plant (MGP). This project involved documenting the nature and extent of a dissolved-phase plume, as well as evaluating the effectiveness of a source-area remediation system. This evaluation has lead to the termination of the active remediation system and the initiation of natural attenuation monitoring.

Sediment Monitoring Plan. Wisconsin Department of Transportation (Sheboygan, Wisconsin). Lead Hydrologist.

Developed a program to monitor the potential for sediment transport downstream from a bridge reconstruction project. The program involved using a flow-averaging suspended sediment sampler to collect upstream and downstream water samples for analysis.

Sediment Removal Feasibility Study. Aluminum Die Casting Facility (Cedarburg, Wisconsin). Lead Hydrologist.

Performed a flood frequency analysis to determine an appropriate risk-based design capacity of a surface water diversion structure that is to be constructed to allow for the removal of sediment containing PCBs. Performed a backwater



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analysis for the diversion structure to evaluate potential upstream impacts from the proposed temporary dam. Evaluated the regional groundwater flow regime and estimated groundwater inflow to the excavation.

Remedial Investigation/Feasibility Study. Louisiana Army Ammunition Plant (LAAP) (Shreveport, Louisiana). Project Manager.

Managed a study that included screening appropriate technologies, and assembling and evaluating remedial alternatives at seven areas within a 21-square mile ammunition plant. Performed and supervised data collection and hydraulic analysis. Developed a regional groundwater flow model for the evaluation of area-specific groundwater remediation alternatives.

Groundwater Investigation/Aquifer Restoration. Arco Minerals (Butte, Montana).

Directed a multi-office modeling effort that will result in the development of regional groundwater flow and contaminant transport models for a CERCLA site in western Montana. The regional model will be used to evaluate the water budget, groundwater flow, contaminant migration, and remedial alternatives.

Remedial Investigation/Feasibility Study of Chlorinated Solvent Contamination. Higgins Industries (Vanderbilt, Michigan). Senior Hydrologist.

Developed a groundwater flow and contaminant transport model for the evaluation of a groundwater remediation system at a site involving soil and groundwater impacted by chlorinated solvents.

Soil Flushing Pilot Study. GM Powertrain (Bay City, Michigan). Project Manager.

Directed the field activities of a successful soil flushing pilot study. The purpose of the study was to evaluate the effectiveness of flushing soil for the removal of polychlorinated biphenyls (PCBs) and oils from the vadose zone. Water and surfactant were applied at the ground surface, collected by an extraction well, and treated in a biological reactor with granular activated carbon.

Groundwater Investigation/Remedial System Design (Northern Michigan). Senior Hydrologist/Engineer.

Directed and performed various phases of groundwater investigation related to releases from a rubber vulcanization process. The project included the design of a groundwater extraction system with on-site disposal through a deep injection well. Managed the project through operation and maintenance, monitoring, and reporting.



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Hydrogeologic Investigation. Production Plated Plastics, Inc. (Richland, Michigan). Project Manager.

Conducted a hydrogeologic investigation that characterized the groundwater hydrogeology and the nature and extent of a dissolved metals plume. Used geostatistical techniques to define the aquifer geometry and plume extents. Developed a groundwater flow model using data from the study to evaluate the effectiveness of an existing purge well network.

Municipal Well Design and Testing. (multiple facilities, Michigan). Hydrologist.

Designed wells, wrote specifications, and performed and analyzed various types of aquifer testing in bedrock and in unconsolidated material at the following facilities:

- City of St. Johns (St. Johns, Michigan)
- City of Williamston (Williamston, Michigan)
- City of Ionia (Ionia, Michigan)
- Meadowridge Estates (West Bloomfield, Michigan)
- Deer Creek Subdivision (Brighton Township, Michigan)

Hydrogeologic Investigation. Florida Department of Health and Rehabilitation Services (Florida). Hydrologist.

Conducted a hydrogeologic investigation to determine the groundwater impacts from septic tank effluent. Used a stochastic solute transport model to evaluate the susceptibility of different regions of the state to groundwater degradation.

Remedial Investigation/Feasibility Study of Chlorinated Solvent Contamination. U.S. Environmental Protection Agency (Battle Creek, Michigan). Hydrologist.

Performed groundwater flow and contaminant transport modeling for the site of a large-scale release of chlorinated solvents. Used the model to evaluate several remedial alternatives for interdicting the plume and protecting a large municipal well field. Developed a one-dimensional unsaturated transport model to estimate the effectiveness of remedial alternatives in the vadose zone.

Education and Training

M.S., Civil and Environmental Engineering, University of Wisconsin - Madison,
1984



John M. Rice, P.E., P.H.

B.S., Civil and Environmental Engineering, University of Wisconsin - Madison,
1982

40-Hour Hazardous Waste Operations Training Course and 8-Hour Refresher
Courses

Registrations and Certifications

Professional Engineer—Iowa, Kansas, Michigan, Wisconsin (NCEES registered)

Professional Hydrologist—Wisconsin, American Institute of Hydrology

Professional Affiliations

American Institute of Hydrology

American Geophysical Union

National Ground Water Association

Wisconsin Ground Water Association

Awards

RMT Awards for Problem Solving and Innovation, Overall Consulting
Excellence, and Promoting Professional Growth

Publications and Presentations

Authored 13 publications and presentations on innovative treatment at
remediation sites.

Koch, S.A., J.M. Rice, T.R. Stolzenburg, K. Baker, and J. Haslow. 2007.
“Reversing Full-Scale ISCO.” Published and presented at the Ninth
International In-Situ and On-Site Bioremediation Symposium. May 7-10, 2007.
Baltimore, Maryland.

Silverman, T., and J. Rice. 2006. “Rapid *In situ* Chemical Oxidation of PCE
Source Area.” Presented at Battelle Ninth International Remediation of
Chlorinated and Recalcitrant Compounds Symposium. May 22-25, 2006.
Monterey, California.

Rice, J.M., S. Koch, A. Sellwood. 2006. Biostimulation of TCE in a Fractured
Bedrock Source Area. Battelle 9th International Remediation of Chlorinated
and Recalcitrant Compounds Symposium. May 22-25, 2006. Monterey,
California. [Proceedings]



John M. Rice, P.E., P.H.

Rice, J.M., T.R. Johnson, D.C. Erni, and J.V. Schittone. 2002. "Stairway to Groundwater Quality –Landfill Groundwater Interceptor Trench and Treatment Systems." Published and presented at the Waste Tech 2002 Landfill Conference. February 24 - 28, 2002. Coral Springs, Florida.

Koch, S.A., and J.M. Rice. 2001. "Enhanced Reductive Dechlorination of PCBs." Presented at the Batelle Conference on In-Situ and On-Site Bioremediation, Sixth International Symposium. June 4-7, 2001. San Diego, California.

Rice, J.M., D. Meyers, and T. Berendes. 1999. "Common Sense Groundwater Investigation and Remediation." Presented at the American Water Works Association Conference. September 22-24, 1999. Oshkosh, Wisconsin.

Rice, J.M., L.P. Bull, and S. Thompson. 1998. "Evaluation of Remediation through Natural Attenuation of a Vinyl Chloride Plume." Presented at the Madison Waste Conference. April 1-2, 1998. Madison, Wisconsin.

Rice, J.M., and P.E. Meyer. 1991. "Use of Geostatistics and Modeling for Groundwater Evaluation and Remediation." The Geological Society of America (GSA), North-Central Section Meeting. GSA Abstracts with Programs. Vol 23, No. 3. March 1991.

Voorhees, M.L. and J.M. Rice. 1987. "InterTrans: Three-Dimensional Solute Transport Model (computer code and documentation)." HydroSoft, Inc. Sarasota, Florida.

Rice, J.M. 1987. "Use of Groundwater Models in Landfill Design." University of Wisconsin, Geotechnical Engineering of Land Disposal Systems, Short Course. October 12-16, 1987. Madison, Wisconsin.

Anderson, D.L., M.L. Voorhees, J.M. Rice, and K.M. Sherman. 1987. Groundwater Modeling with Uncertainty Analysis to Assess Contamination Potential from On-Site Sewage Disposal Systems in Florida. American Society of Agricultural Engineers (ASAE) On-Site Sewage Disposal Symposium Proceedings. December 14-16, 1987. Chicago, Illinois. [Proceedings]

Voorhees, M.L. and J.M. Rice. 1987. Application of Sensitivity and Second Order Uncertainty Analysis in Formulating Regional Groundwater Contamination Risks and Data Sensitivities. Solving Groundwater Problems with Models, NWWA Conference Proceedings. February 10-12, 1987. Denver, Colorado.



John M. Rice, P.E., P.H.

Rice, J.M., M.L. Voorhees, and A.C. Okeke. 1985. "Use of a Cell Model in Predicting liquids Movement and Levels in a Landfill Site." Presented at the Madison Waste Conference. September 18-19, 1985. Madison, Wisconsin. Also presented at the Hazardous Materials Control Research Institute (MMCRI) Management of Hazardous Waste Conference. November 4-6, 1985. Washington, D.C.

Potter, K.M. and J.M. Rice. 1987. "Estimating Baseflow Volume and Its Uncertainty." Water Resources Bulletin. 1987.



Eric Watruba

Environmental Specialist

Experience

Eric has over 4 years of experience in the environmental and geotechnical fields involving planning, investigating, analyzing, reporting, designing, specification writing, permitting, construction services, and contract administration. Eric has worked on environmental remediation, solid and industrial waste landfill, wind farm, and biogas-to-energy projects. His responsibilities include communication with clients and regulatory agencies and coordinating RMT's project teams.

Key Projects

Closure Plan for CKD Landfill. Essroc-Logansport. Essroc Italcementi Group (Logansport, Indiana). Technical Coordinator.

Served as lead technical coordinator for the preparation of a closure plan to close the existing 23- and 25-acre CKD piles. The closure design includes grading the existing piles, covering the piles with a composite cover, and developing long-term monitoring plans.

HOD Landfill. Waste Management of Illinois, Inc. (Antioch, Illinois). Technical Coordinator/Environmental Specialist/Field Technician.

Served as lead technical coordinator for providing on-going operations, maintenance, and monitoring assistance for a closed, monitored natural attenuation Superfund site with a leachate/gas extraction system and a 360 kW gas-to-energy system. Prepared technical reports for submittal to the regulatory agency. Provided on-site quality assurance for the redevelopment of the Superfund site into athletic fields and related features for the Antioch Community High School.

Landfill Liner, Phase 3A. ThyssenKrupp Waupaca Foundry, Inc. (Tell City, Indiana). Environmental Specialist/Field Technician.

Assisted in preparing the proposal, plans, and specifications for a 3.1-acre foundry sand landfill expansion phase with a 3-foot-thick clay liner. Provided on-site quality assurance for construction and installation of the gradient control layer, geotextile cushion, and clay liner. Completed certifying documentation report.



Eric C. Watruba

Gas Extraction System and Pump Installation. City of Belvidere (Boone County) Landfill #2 (Belvidere, Illinois). Environmental Specialist/Field Technician.

Assisted in preparing proposal, plans, and specifications for the installation of gas extraction wells and conveyance piping. Provided on-site quality assurance for the construction of gas wells and piping installation. Completed the certifying documentation report.

Landfill Expansion, Phase 8. Onyx FCR Landfill (Wright County, Minnesota). Field Technician.

Provided on-site quality assurance during the geomembrane installation of this 7.1-acre landfill liner. Responsibilities included observation and documentation, management of geosynthetic quality assurance testing, and coordination among various contractors.

Landfill Gas Management Systems Evaluations. City of Madison Landfill Sites (Madison, Wisconsin). Environmental Specialist.

Collected raw landfill gas and conducted an evaluation of the gas at four separate landfills (Greentree, Mineral Point, Olin Avenue, and Sycamore) to determine if the current landfill gas management system operations could be modified.

Landfill Gas Management System OM&M. Waste Management Muskego Landfill (Muskego, Wisconsin). Field Technician.

Served as an on-site field technician for the landfill gas management system OM&M activities for this closed landfill site.

Landfill Gas Management System OM&M. Waste Management Stone Ridge Recycling and Disposal Facility (Muskego, Wisconsin). Field Technician.

Served as an on-site field technician for the landfill gas management system OM&M activities for this closed landfill site.

Final Cover Construction. Onyx FCR Landfill (Wright County, Minnesota). Field Technician.

Performed extensive documentation on the geomembrane cover installation for an 11.5-acre area of the landfill, including on-site coordination of various contractors' work. Responsibilities included observation and documentation and management of geosynthetic quality assurance testing.



Eric C. Watruba

Landfill Liner Construction, Phase 7. Onyx FCR Landfill (Wright County, Minnesota). Field Technician.

Provided on-site quality assurance during the geomembrane installation of a 2.5-acre landfill liner. Responsibilities included observation and documentation, management of geosynthetic quality assurance testing, and coordination among various contractors.

Landfill Liner Construction, Phase 4. Onyx Orchard Hills Landfill (Davis Junction, Illinois). Field Technician.

Assisted with on-site quality assurance for the construction and installation of the geomembrane, geotextile cushion, and select aggregate drainage/pipe bedding layers. Provided observation and documentation of the leachate collection and cleanout pipe installation; performed soil and geosynthetic testing and soil thickness verifications; and coordinated construction of the 7-acre landfill liner system.

Geotechnical Services for Wind Farms.

Assisted with the geotechnical investigations and evaluations for turbine foundations, transmission line foundations, electrical collector systems, grounding systems, access roads, crane pads, and crane paths for the following wind farms:

Areas of Expertise

- Geotechnical and geoenvironmental engineering
- Landfill design
- Environmental remediation
- Biogas-to-energy systems

- Fowler Ridge Wind Farm and transmission line, BPAE (Fowler, Indiana)
- Cedar Ridge Wind Farm, Wisconsin Power and Light (Fond du Lac County, Wisconsin)
- Blue Sky Green Field Wind Farm, WE Energies, Inc. (Fond du Lac County, Wisconsin)

Education and Training

B.S., Geological Engineering, University of Wisconsin-Madison, 2004

B.S., Geology and Geophysics, University of Wisconsin-Madison, 2004

National Fire Protection Association Arc Flash Training, 2008

National Safety Council Defensive Driving Course, 2008

Storm Water Detention Basin Design Course, University of Wisconsin-Madison, 2007

Storm Sewer System Design Course, University of Wisconsin-Madison, 2007

8-Hour Hazardous Waste Operations Refresher Training, 2007



Eric C. Watruba

40-Hour Hazardous Waste Operations Training, 2005

Sanitary Landfill Design Course, University of Wisconsin-Madison, 2005

Fundamentals of Engineering-Wisconsin, April 2004

Registrations and Certifications

American Red Cross First Aid/Adult CPR Certification, 2008

Nuclear Density Gauge Usage Certification, 2005